

Optical and Solubility Contrast in Epoxy Photoresists for Holographic Lithography

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The successful fabrication of photonic crystals by holographic lithography [1] relies on the availability of negative working photoresists whose insolubility is a strongly non-linear function of optical exposure. Most examples of such work use the commercially available, oligomeric, multifunctional epoxide SU-8. Here we describe various compositional and processing factors that control the insolubility contrast for this material. We also describe the properties of a novel epoxy-functionalized dendrimer synthesized in this laboratory. We emphasize the limits that the resist properties set on the holographic intensity contrast, and the constraints that these in turn place on the proper choice of beam parameters. For example, not all the reported solutions for formation of interference patterns with cubic diamond symmetry have sufficient optical contrast to enable them to be used to create photonic crystals holographically using these epoxy resists.

[1] M. Campbell et al., *Nature*, **404**, 53 (2000).